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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/582,112

06/08/2006

Maki Ito

Q95033

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7590

11/24/2008

SUGHRUE MION, PLLC

2100 Pennsylvania Avenue, N.W.

Washington, DC 20037

EXAMINER

NGUYEN, TAI V

ART UNIT

PAPER NUMBER

3729

NOTIFICATION DATE

DELIVERY MODE

11/24/2008

ELECTRONIC

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

USPTO@sughrue.com

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USPatDocketing@sughrue.com

<b>Office Action Summary</b>	<b>Application No.</b> 10/582,112	<b>Applicant(s)</b> ITO ET AL.	
	<b>Examiner</b> TAI NGUYEN	<b>Art Unit</b> 3729	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 13 August 2008.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-17 is/are pending in the application.
- 4a) Of the above claim(s) 1-5, 15 and 16 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 6-14 and 17 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)          | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)          | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____  | 6) <input type="checkbox"/> Other: _____                          |

**DETAILED ACTION**

***Response to Amendment***

1. The applicants' amendment filed 8/13/2008 has been fully considered and made of record.

***Claim Rejections - 35 USC § 103***

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 6, 12, 13, 17/6, 17/12/6 and 17/13/12/6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shimada et al (US 6,378,996) in view of Joo et al (6,268,258).

As applied to claim 6, Shimada et al disclose a method of manufacturing an actuator device comprising the steps of: forming a vibration plate (300) above one surface of a substrate (10); and forming a piezoelectric element (70) a lower electrode (60), a piezoelectric layer, and an upper electrode (80) above the vibration plate, wherein the forming the vibration plate comprises: forming an insulation film as read as dielectric comprising zirconium oxide (55) by forming a zirconium layer above the one surface of the substrate and subjecting the zirconium layer to thermal oxidation while heating the zirconium layer up to a predetermined temperature at a predetermined rate of temperature increase (col. 10, lines 33-43).

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However, Shimada et al does not disclose adjusting stress of the insulation film by annealing the insulation film at a temperature less than or equal to a maximum temperature in thermal oxidation of the zirconium layer. Joo et al teaches the annealing the insulation film at a temperature less than or equal to a maximum temperature in thermal oxidation of the zirconium layer (col. 2, lines 4-17).

As applied to claim 12, Shimada et al disclose a temperature upon thermal oxidation of the zirconium layer is set in a range from 800°C to 1000°C (col. 10, lines 33-43).

As applied to claim 13, Joo et al disclose a temperature upon the thermal annealing the insulation film is set in a range from 800°C to 900°C (col. 5, lines 1-20).

As applied to claim 17/6, Shimada et al show liquid jet head the actuator device (e.g. 300).

As applied to claim 17/12/6, Shimada et al teach a temperature (col. 10, lines 40-43).

As applied to claim 17/13/12/6, Joo et al teach a temperature upon annealing (col. 5, lines 15-20).

It would have been obvious to one of ordinary skill in the art at this time the invention was made to have modified the method of Shimada by annealing the

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zirconium oxide, as taught by Joo, to provide an insulation film having a high dielectric constant (col. 5, lines 8-13).

4. Claims 14 and 17/14/13/12/6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shimada et al in view of Joo et al and further in view of Shimada et al (US 5,802,686) here in after '686.

As applied to claim 14, Shimada et al modified Joo does not teach that the step of a time period for annealing the insulation film is adjusted in a range from 0.5 to 2 hours. However, '686 teach the step of a time period for annealing the insulation film is adjusted in a range from 0.5 (col. 5, lines 6-18).

As applied to claim 17/14/13/12/6, '686 teach a time period for annealing the insulation film is (col. 5, lines 6-18).

It would have been obvious to one of ordinary skill in the art at this time the invention was to have modified the method of Shimada by including a time period for annealing, as taught by '686, to positively provide reduce the stress applied to single crystal silicon substrate (col. 3, lines 11-12).

5. Claims 7-11, 17/7/6, 17/8/7/6, 17/9/8/7/6 and 17/11/10/7/6/are rejected under 35 U.S.C. 103(a) as being unpatentable over Shimada et al.

Regarding to claims 7-11, 17/7/6, 17/8/7/6, 17/9/8/7/6 and 17/11/10/7/6/, it would have been matter of engineering design to choose any desired rate of temperature increase upon thermal oxidation of the zirconium layer that is set greater than 5°C/sec,

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50°C/sec, RTA, and a density of the insulation film set greater than 5.0 g/cm<sup>3</sup> and a film thickness of the insulation is set greater than 40 nm, since the applicants have not the claimed that these features solve any problem or is for any particular purpose and it appear that the invention would perform well with thermal oxide, density and thickness of the applied art above.

### ***Response to Arguments***

6. Applicant's arguments regarding rejected claims 6-14 and 17 filed 8/13/2008 have been fully considered but they are not persuasive.

The applicants argue that the Joo et al does not teach: "adjusting stress of the insulation film by annealing the insulation film at a temperature less than or equal to a maximum temperature in the thermal oxidation of the zirconium layer" (as recited in claim 6, lines 11-12).

The examiner disagrees. Joo et al fully discloses annealing the insulation film at a temperature less than or equal to a maximum temperature in the thermal oxidation of the zirconium layer (col. 2, lines 4-30). The incorporation of this step into the Shimada method will inherently lead to "adjusting stress of the insulation film" as recited in claim 6. As disclosed by Joo et al. (in col. 5, lines 8-13), the annealing step also forms a Petrovskite phase in the zirconium oxide layer having a high dielectric constant.

Therefore, the claims do not distinguish over the combination of references.

### ***Conclusion***

7. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

8. as read Any inquiry concerning this communication or earlier communications from the examiner should be directed to TAI NGUYEN whose telephone number is (571)272-4567. The examiner can normally be reached on M-F (7:30 A.M - 4:30 P.M).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Bryant can be reached on 571-272-4526. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

November 12, 2008

TN

/DAVID P. BRYANT/  
Supervisory Patent Examiner, Art Unit 3726